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# Nomenclator and Review of *Phyllostegia* (Lamiaceae)

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**ABSTRACT.** In 1987 Harold St. John published 93 names in Hawaiian *Phyllostegia* and 1 in Tonga; only 3 of them were accounted for in the most recent taxonomic revision of the Hawaiian species by Wagner et al. in 1990. The types of these names are analyzed, and the names are here incorporated into the current classification. Only five of the new Hawaiian species are here recognized as distinct (*P. kaalaensis*, *P. kahiliensis*, *P. micrantha*, *P. pilosa*, and *P. warshaueri*), and one of the new combinations is accepted here (*P. velutina*), with the remainder here placed into the synonymy of other species. Five of the names were not validly published. The complete nomenclature of *Phyllostegia* at the species level and below is presented, including 181 names. A total of 32 Hawaiian *Phyllostegia* species are currently recognized, including the 5 recognized St. John species published in 1987 and 2 others, *P. haliakalae*, resurrected from the synonymy of *P. mollis*, and *P. renovans*, discovered in 1989. The five Hawaiian species not treated in the 1990 revision are briefly characterized and discussed. Notes adding information on taxonomy, distribution, and population and conservation status not included in the recent treatment also are given. The genus also is known from Tahiti and Tonga, each with one species; the nomenclature for these two species is included, but they are not evaluated in this paper.

In late 1987 and early 1988, as the final manuscript for the *Manual of the Flowering Plants of Hawai'i* (Wagner et al., 1990) was about to be sent to the publisher, St. John published an unfortunate, hurried series of papers, mostly cited in Wagner et al. (1990), in which he published about 880 manuscript names. Over a period of more than 30 years, he had developed lengthy manuscripts with accompanying detailed illustrations for a number of genera in a style similar to his treatment of O'ahu *Cyrtandra* (St. John, 1966), but few of them had been published. St. John published the new taxa and combinations from all of these manuscripts in *Phytologia* and in a series of privately published papers, providing little more than a brief Latin diagnosis and an abbreviated (and sometimes partly

erroneous) mention of the type. This has had serious consequences: errors in citation of specimens, the use of a name more than once in the same genus (often even in the same paper), and the use of the same specimen as the type of more than one name. More importantly, he did not incorporate the taxa into a carefully evaluated taxonomic system. Now, after nearly 10 years, most of the approximately 880 names (including combinations) have been analyzed.

This is the first of a series of papers analyzing the names published in 1987 and 1988 by St. John, in which the nomenclature is evaluated and the taxa are incorporated into current classifications. The second paper will be on names in the Cucurbitaceae (Wagner & Shannon, 1999). Additional papers in this series will deal with names in *Stenogyne* (Lamiaceae), *Cyrtandra* (Gesneriaceae), and the special problems of the not valid and illegitimate names. St. John names in Campanulaceae published in 1987 and 1988 have been studied by T. Lammers (see Lammers, 1998, and papers cited therein).

Although all names for Hawaiian angiosperms published through 1986 and a few from 1987 and 1988 were included by Wagner et al. (1990) in the *Manual of the Flowering Plants of Hawai'i*, a rigorous assessment of them has never been done. The nomenclatural database, initiated in 1983 as part of the Hawaiian Flora Project at Bishop Museum, has been expanded to include all of these additional names by St. John. It will be available on the WWW in the future.

In analyzing the nomenclature for the genus *Phyllostegia* (Lamiaceae) a number of problems were discovered. These included names not validly published, errors in original publications, and typification problems. Only 3 of the 93 Hawaiian names published by St. John (1987) were incorporated into the taxonomy of the genus as treated in the most recent revision (Wagner et al., 1990). Presented here is a complete nomenclator of 181 names in *Phyllostegia*, including a number of not validly published names. Since the emphasis of this paper is on nomenclature rather than classification

or phylogeny of the group, the accepted names are arranged alphabetically. Of the 93 Hawaiian taxa (78 new species, 3 new varieties, and 12 new combinations) described by St. John, 5 of the new species are here recognized as distinct (*P. kaalaensis*, *P. kahiliensis*, *P. micrantha*, *P. pilosa*, and *P. warshaueri*), with *P. warshaueri* being adopted in the 1990 revision by Wagner et al. In addition, one of the new combinations is accepted here (*P. velutina*), which was also adopted in the Wagner et al. revision; the remainder are here placed into the synonymy of other species. Five of the names were not validly published.

The complete nomenclature of *Phyllostegia* at the species level and below is presented. A total of 32 Hawaiian *Phyllostegia* species are currently recognized, including the 5 recognized St. John species published in 1987 and 2 others, *P. haliakalae*, resurrected from the synonymy of *P. mollis*, and *P. renovans*, discovered in 1989. The five species (*P. kaalaensis*, *P. kahiliensis*, *P. micrantha*, *P. pilosa*, and *P. renovans*) not treated in the 1990 revision are briefly characterized and discussed. Notes adding information on taxonomy, distribution, and conservation status not included in the recent treatment also are given, especially for the 14 taxa listed as endangered since 1987, and others I believe to be at risk. The genus also occurs in Tahiti and Tonga, each with one species; the nomenclature for these two species is included, but they are not evaluated in this paper.

**1. *Phyllostegia ambigua*** (A. Gray) Hillebrand, Fl. Hawaiian Isl. 350. 1888. *Phyllostegia brevidens* A. Gray var.? *ambigua* A. Gray, Proc. Amer. Acad. Arts 5: 343. 1862. TYPE: Hawaiian Islands [U.S.A.]. Maui: West Maui, 1840, *U. S. Expl. Exped. s.n.* (holotype, US-57473; isotype, GH not seen).

*Phyllostegia grandiflora* (Gaudichaud) Benth. var. *hirsutula* Hillebrand, Fl. Hawaiian Isl. 349. 1888. *Phyllostegia brevidens* A. Gray var. *hirsutula* (Hillebrand) Sherff, Amer. J. Bot. 21: 699. 1934. TYPE: Hawaiian Islands [U.S.A.]. Maui: West Maui, in forests, s.d., *E. Bishop* 76 (holotype, B presumably destroyed, photo F not seen). Maui: West Maui, mauka of McGregor, rain forest, 9 Mar. 1952, *O. Degener, Tam, Tousley & Barber* 22024 (neotype, designated by Sherff (1953: 18), F not seen; isoneotypes, BISH, US). Sherff designated the Degener specimen as lectotype, but it must be taken as a neotype.

*Phyllostegia brevidens* A. Gray var. *expansa* Sherff, Bot. Gaz. (Crawfordsville) 96: 139. 1934. TYPE: Hawaiian Islands [U.S.A.]. Maui: West Maui, [Pu'u Kukui] Mt. Eke, 1851–1871, *W. Hillebrand s.n.* (holotype, B presumably destroyed).

*Phyllostegia brevidens* A. Gray var. *heterodoxa* Sherff, Amer. J. Bot. 21: 700. 1934. *Phyllostegia heterodoxa*

(Sherff) H. St. John, Phytologia 63: 175. 1987. TYPE: Hawaiian Islands [U.S.A.]. Hawai'i: Ka'u, Na'alehu, along Hilea Trail, 1600–3000 ft., 15 Jan. 1912, *J. F. Rock* 10014 (holotype, BISH-510654; isotypes, F not seen, BISH [2]). Locality and date from Rock's field notes.

*Phyllostegia brevidens* A. Gray var. *pauciflora* Sherff, Bot. Gaz. (Crawfordsville) 96: 139. 1934. TYPE: Hawaiian Islands [U.S.A.]. Maui: [East Maui], South Haleakala, 1851–1871, *W. Hillebrand s.n.* (holotype, B presumably destroyed).

*Phyllostegia brevidens* A. Gray var. *pubescens* Sherff, Bot. Gaz. (Crawfordsville) 96: 138. 1934. TYPE: Hawaiian Islands [U.S.A.]. Maui: [East Maui], Upper Kula, s.d., *J. M. Lydgate s.n.* (holotype, B presumably destroyed).

*Phyllostegia brevidens* A. Gray var. *degeneri* Sherff, Amer. J. Bot. 28: 28. 1941. TYPE: Hawaiian Islands [U.S.A.]. Maui: [East Maui], Haleakala, NW side of Ko'olau Gap, in fogswept jungle, 6000 ft., 20 Aug. 1939, *O. Degener, E. Ordoñez & F. C. Salucop* 12464 (holotype, F not seen [mounted on 2 sheets]; isotypes, BISH, NY [microfiche]).

*Phyllostegia degeneri* Sherff, Brittonia 12: 172. 1960. TYPE: Hawaiian Islands [U.S.A.]. Maui: [East Maui], Haleakala, W side of Ko'olau Gap, in rich, open forest, 28 May 1959, *O. Degener & W. Fleming* 25235 (holotype, F not seen; isotypes, BISH [2], F not seen, NY [microfiche], US).

*Phyllostegia longimontis* H. St. John, Pacific Sci. 30: 29. 1976. TYPE: Hawaiian Islands [U.S.A.]. Hawai'i: [Kona, 26–29 Jan. 1779], *D. Nelson s.n.* (holotype, BM-550453).

*Phyllostegia alba* H. St. John, Phytologia 63: 172. 1987. Syn. nov. TYPE: Hawaiian Islands [U.S.A.]. Maui: [West Maui, Honokahau Drainage Basin, summit of Eeka, upper part of main ridge], 27 Sep. 1917, *C. N. Forbes* 363.M (holotype, BISH-53537; isotype, BISH).

*Phyllostegia chartacea* H. St. John, Phytologia 63: 173. 1987. Syn. nov. TYPE: Hawaiian Islands [U.S.A.]. Maui: East Maui, Waikamoi Trail, May 1911, *J. F. Rock s.n.* (holotype, BISH-53379).

*Phyllostegia elliptica* H. St. John, Phytologia 63: 174. 1987. Syn. nov. TYPE: Hawaiian Islands [U.S.A.]. Maui: East Maui, Hana Forest Reserve, 5675 ft., 29 June 1973, *B. Harrison* 257 (holotype, BISH-513265; isotype, BISH).

*Phyllostegia hiati* H. St. John, Phytologia 63: 175. 1987. Syn. nov. TYPE: Hawaiian Islands [U.S.A.]. Maui: East Maui, Ko'olau Gap, Ainahou, 6000 ft., 16 Feb. 1980, *R. Hobdy* 762 (holotype, BISH-522877). R. Hobdy (pers. comm.) indicated that the collection number is 769, not 762 as indicated in protologue.

*Phyllostegia konaensis* H. St. John, Phytologia 63: 176. 1987. Syn. nov. TYPE: Hawaiian Islands [U.S.A.]. Hawai'i: Hanehane, Kona, a few miles SW of Pu'uwa'awa'a, 16 June 1911, *C. N. Forbes* 183a.H (holotype, BISH-53371). St. John used a portion of *Forbes* 183.H, and added "a" to the collection number; the other portion of this collection was published as the holotype of *P. decumbens* and *Stenogyne adpressa*. Neither of these names is validly published under ICBN Art. 34.2 (Greuter et al., 1994).

*Phyllostegia lebishopii* H. St. John, Phytologia 63: 177. 1987. Syn. nov. TYPE: Hawaiian Islands [U.S.A.]. Maui: East Maui, Haleakala, Pu'u o Kakae, 4700 ft.,

- 15 Apr. 1971, *L. E. Bishop*, [*W.*] *Gagné* & *S. L. Montgomery* 0471113 (holotype, BISH-573150).
- Phyllostegia odorata* H. St. John, *Phytologia* 63: 179. 1987. Syn. nov. TYPE: Hawaiian Islands [U.S.A.]. Maui: West Maui, Kapilau Ridge, 28 Feb. 1980, *R. Hobdy* 775 (holotype, BISH-522878).
- Phyllostegia orientalis* H. St. John, *Phytologia* 63: 179. 1987. Syn. nov. TYPE: Hawaiian Islands [U.S.A.]. Maui: East Maui, gulch next to base camp ridge, USFWS Forest Bird Survey, 6300 ft., 18 May 1985, *F. R. Warshauer* 2535 (holotype, BISH-511688).
- Phyllostegia pilosicincta* H. St. John, *Phytologia* 63: 179. 1987. Syn. nov. TYPE: Hawaiian Islands [U.S.A.]. Maui: East Maui, Haleakala, Upper Waikamoi, 14 Jan. 1976, *E. Smith* & *J. Davis* s.n. (holotype, BISH-522875; isotype, BISH).
- Phyllostegia pluriflora* H. St. John, *Phytologia* 63: 180. 1987. Syn. nov. TYPE: Hawaiian Islands [U.S.A.]. Hawai'i: *I. M. Tomich* 4005 (holotype, BISH not seen). The holotype has been missing since at least October 1987. Tentative disposition, based on the description.
- Phyllostegia repanda* H. St. John, *Phytologia* 63: 180. 1987. Syn. nov. TYPE: Hawaiian Islands [U.S.A.]. Hawai'i: South Kohala Dist., Kohala Mountains, SW of Pu'u Poho'ula'ula, wet 'ohi'a forest, USFWS Forest Bird Survey Transect 80 (33/34), 4160 ft., 31 July 1979, *L. Stemmermann* & *S. L. Montgomery* 3976 (holotype, BISH-469848).
- Phyllostegia suaveolens* H. St. John, *Phytologia* 63: 181. 1987. Syn. nov. TYPE: Hawaiian Islands [U.S.A.]. Hawai'i: Kilauea Forest Reserve, near fence line of Meyer's Ranch, 4300 ft., 15 Apr. 1980, *J. Davis* 276 (holotype, BISH-520029).

The range of *Phyllostegia ambigua* is expanded on the island of Hawai'i somewhat with the addition of the types placed here to include Kilauea Volcano, the Kohala Mountains, and at least until 1911 Hualalai in addition to Mauna Loa. It also occurs on East and West Maui.

- 2. *Phyllostegia bracteata*** Sherff, *Bot. Gaz.* (Crawfordsville) 96: 137. 1934. TYPE: Hawaiian Islands [U.S.A.]. Maui: West Maui, Pu'u Kukui, [upper] forest, 4000–5000 ft., 24–26 Sep. 1916, *A. S. Hitchcock* 14746 (holotype, US-873135).

*Phyllostegia bracteata* historically occurred at a number of widely separated localities on East and West Maui, but is now quite rare with apparently only a few populations still extant. It has only been collected a few times this century, and was most recently collected in 1992 (Waikamoi, East Maui, *Wood et al.* 1623, NY, PTBG, US). According to *J. Lau* (pers. comm. 1998) there are several extant populations, including one along the Waikamoi Flume road, and another on the Waikamoi Flume, Kipahulu Valley and the adjacent Manawainui. He estimated there are most likely a number of unreported populations since there is a lot of wet forest

habitat on East and West Maui, and it is in relatively good shape.

- 3. *Phyllostegia brevidens*** A. Gray, *Proc. Amer. Acad. Arts* 5: 343. 1862. TYPE: Hawaiian Islands [U.S.A.]. Hawai'i: [in the forest] on Mouna [Mauna] Kea, 3000 ft., 1840, *U. S. Expl. Exped. s.n.* (holotype, US-57474; isotype, GH not seen).

- Phyllostegia polyantha* H. St. John, *Phytologia* 63: 180. 1987. Syn. nov. TYPE: Hawaiian Islands [U.S.A.]. Hawai'i: Kulani project land S of Mauna Loa Boys' School, moist gully, open to scattered *Metrosideros* forest with open *Cibotium* understory, 5700 ft., 26 Feb. 1981, *G. Clarke* 574 (holotype, BISH-520031).

*Phyllostegia brevidens* was considered to be extinct, because it was known from only two collections made in the mid to late 1800s (Wagner et al., 1990). It has been recently discovered on East Maui in Kipahulu Valley, and rediscovered on Hawai'i (type of *P. polyantha*). It is apparently known from only a few populations and probably should be considered endangered. These collections, at least one of which I earlier determined as *P. ambigua*, did not completely fit the description of *P. brevidens* provided by Wagner et al. (1990). They appear to be better accommodated within a somewhat emended *P. brevidens* than in *P. ambigua*, where they did not fit the description provided by Wagner et al. (1990) in the more numerous flowers per verticillaster (14–30), glabrate in the upper part and densely hirsute on lower stems, smaller calyx 4–6 mm long, and the nearly obsolete calyx lobes (or on Maui with lobes up to 1.8 mm long).

*Specimens examined.* HAWAIIAN ISLANDS [U.S.A.]. **East Maui:** Kipahulu Valley, lower dog leg, 730 m, 9 Mar. 1988, *Wagner et al.* 5897 (BISH, PTBG, US); Kipahulu Valley, Palikea drainage, 2920–3050 ft., 20 May 1994, *Wood et al.* 3200 (AD, BISH, MO, NY, PTBG, US). **Hawai'i:** [North Hilo District], Hakalau National Refuge, Piha, 100 m in from Maulua middle fence, 5450 ft., 8 Oct. 1991, *Perlman & Jeffery* 12293 (PTBG); [South Hilo District] Hilo, *Hillebrand & Lydgate* s.n. (BISH), *Hillebrand* s.n. (BISH); McCandless Ranch, Waiea Section, rain forest, . . . growing from the floor of a collapsed lava tube . . . [which] prevented cattle from reaching subject plant, 16 Apr. 1985, *Giffin* s.n. (BISH).

- 4. *Phyllostegia electra*** C. N. Forbes, *Occas. Pap. Bernice P. Bishop Mus.* 6(3): 180. 1916. TYPE: Hawaiian Islands [U.S.A.]. Kaua'i: power line trail between Kapaka and Kualapa, 6–9 Aug. 1909, *C. N. Forbes* 143.K (holotype, BISH-499098; isotypes, BISH [2], MO not seen).

*Phyllostegia mollis* Bentham var. *skottsbergii* Sherff, *Field*

Mus. Nat. Hist., Bot. Ser. 17: 577. 1939. TYPE: Hawaiian Islands [U.S.A.]. Kaua'i: Koke'e, in dense woods, 3600 ft., 8 Mar. 1926, *G. P. Wilder 451* (holotype, F-954570 [photo F not seen]).

*Phyllostegia mollis* Benth. var. *resinosa* Fosberg, Occas. Pap. Bernice P. Bishop Mus. 16(15): 345. 1942. TYPE: Hawaiian Islands [U.S.A.]. Kaua'i: plateau at head of Kalalau Valley, in wet forest, 375 m, 29 Dec. 1935, *F. R. Fosberg 12696* (holotype, BISH not seen). The holotype has been missing at least since August 1997.

*Phyllostegia mollis* Benth. var. *fagerlindii* Sherff, Occas. Pap. Bernice P. Bishop Mus. 20(1): 13. 1949. *Phyllostegia fagerlindii* (Sherff) H. St. John, Phytologia 63: 174. 1987. TYPE: Hawaiian Islands [U.S.A.]. Kaua'i: northernmost Kaua'i, Hanalei Valley, above second house, 9 Mar. 1948, *F. Fagerlind & C. Skottsberg 6533* (holotype, S [photo F not seen]). Published as in GB; however, the photograph in the original publication labeled "type" is of a specimen at S.

*Phyllostegia mollis* Benth. var. *hochreutineri* Sherff, Bot. Leaflet 8: 18. 1953. TYPE: Hawaiian Islands [U.S.A.]. Kaua'i: Waimea, near the Gay cottage [at Kaholuanui], 1400 m, 20 Apr. 1905, *B. P. G. Hochreutiner 3579* (holotype, G [photo F not seen]). Sherff erroneously cited the island as Hawai'i.

*Phyllostegia adenophora* H. St. John, Phytologia 63: 172. 1987. Syn. nov. TYPE: Hawaiian Islands [U.S.A.]. Kaua'i: Kau'umohua Ridge, 27 Jan. 1920, *J. F. Rock 17313* (holotype, BISH-53740).

*Phyllostegia capitata* H. St. John, Phytologia 63: 173. 1987. Syn. nov. TYPE: Hawaiian Islands [U.S.A.]. Kaua'i: Alakai Swamp Trail, S of Lehuamakanoi, 3900 ft., 17 Apr. 1981, *J. H. R. Plews 80* (holotype, BISH-522872).

*Phyllostegia fayi* H. St. John, Phytologia 63: 174. 1987. Syn. nov. TYPE: Hawaiian Islands [U.S.A.]. Kaua'i: near crest of ridge separating Hali'i Stream and Kamo'oloa Stream, 450 m, 28 June 1976, *J. Fay 555* (holotype, PTBG-15148; isotype, BISH). Although not indicated in the publication, the holotype belongs to PTBG; it was inadvertently mounted by BISH while on loan.

*Phyllostegia electra* has been collected at many localities over the past decade. It is not common anywhere, but has a wide, scattered distribution in mesic and wet forest over much of Kaua'i. It is probably the most commonly collected species of the genus on Kaua'i. It has a partly overlapping distribution with *P. helleri*, with which it is sometimes confused, but differs in its short-hispidulous pubescence, the trichomes 0.1–0.3(–0.5) mm long, and usually some of the trichomes are gland-tipped. It is probably most closely related to *P. parviflora*.

**5. *Phyllostegia floribunda*** Benth. Gen. Spec. 653. 1835. TYPE: Hawaiian Islands [U.S.A.]. Hawai'i: [probably 26–29 Jan. 1779], *D. Nelson s.n.* (holotype, BM-550454 [photo BISH not seen]; isotype, BM).

*Phyllostegia floribunda* Benth. var. *forbesii* Sherff, Amer.

J. Bot. 21: 699. 1934. *Phyllostegia forbesii* (Sherff) H. St. John, Pacific Sci. 30: 25. 1976. TYPE: Hawaiian Islands [U.S.A.]. Hawai'i: Kona, Ka'alapu'u-wale, 30 June 1911, *C. N. Forbes 294.H* (holotype, MO-821348; isotypes, BISH [3]).

*Phyllostegia villosa* H. St. John, Pacific Sci. 30: 31. 1976 [1977]. TYPE: Hawaiian Islands [U.S.A.]. Hawai'i: upper edge of Waipio Valley, along trail from back of Waimea, 4000 ft., June 1910, *J. F. Rock 8352* (holotype, BISH-510103).

*Phyllostegia axillaris* H. St. John, Phytologia 63: 172. 1987. Syn. nov. TYPE: Hawaiian Islands [U.S.A.]. Hawai'i: Hilo Forest Reserve, Laupahoehoe section, between Ka'awali'i and Kaiwilahilahi Streams, 3420 ft., 2 Feb. 1982, *S. Anderson 488* (holotype, BISH-518753).

*Phyllostegia floribunda* is considered to be rare, known from a few scattered sites; it was most recently collected in 1982 and again in 1991 behind the Volcano Village dump (*Flynn 761*, PTBG, and *Wood et al. 505*, PTBG not seen), and in 1982 between Ka'awali'i and Kaiwilahilahi Streams (type of *P. axillaris*). J. Lau (pers. comm. 1998) indicated that extant populations are known from Puna District (couple of sites in Pu'u Maka'ala; Kahaualea; couple of places on the East Rift Zone; and Volcano Dump), North Hilo District (several locations in Laupahoehoe), and South Kona District (Kukuio-pae).

This red-flowered species, along with *P. knudsenii* and *P. wawrana*, was placed in *Phyllostegia* sect. *Lateriflorae* A. Gray by Sherff (1935). The same delimitation was followed by Wagner et al. (1990). Based on the ample material of the white-flowered species now at hand I exclude them from the section, because they have both axillary and terminal inflorescences, which was the only character to distinguish the section.

**6a. *Phyllostegia glabra*** (Gaudichaud) Benth. var. ***glabra***

*Phyllostegia glabra* (Gaudichaud) Benth. Edwards's Bot. Reg. 15: 1292. 1830. [Epithet published as "*glabrum*."] *Prasium glabrum* Gaudichaud, Voy. Uranie 452. 1829. TYPE: s.l., 550–735 m, 1819, *C. Gaudichaud-Beaupré s.n.* (holotype, P not seen).

*Phyllostegia chamissonis* Benth. Linnaea 6: 79. 1831. TYPE: Hawaiian Islands [U.S.A.]. O'ahu: 1816–1817, *L. C. A. von Chamisso s.n.* (holotype, LE not seen).

*Phyllostegia macraei* Benth. Prodr. 12: 554. 1848. *Phyllostegia glabra* (Gaudichaud) Benth. var. *macraei* (Benth.) Sherff, Bot. Gaz. (Crawfordsville) 96: 136. 1934. TYPE: Hawaiian Islands [U.S.A.]. O'ahu: 9–26 May 1825, *J. Macrae s.n.* (lectotype, designated by Sherff (1935: 31), K). Additional syntypes, O'ahu: *Beechey s.n.*, *Nelson s.n.*

*Phyllostegia glabra* (Gaudichaud) Benth. f. *fauriei* O. Degener & I. Degener, Fl. Hawaiiensis, fam. 316. *Phyllostegia glabra*. Part 2. 1960. TYPE: Hawaiian

Islands [U.S.A.]. Kaua'i: Waimea, 1000 m, 1910, *U. Faurie* 896 (holotype, BISH-510030). The label may not be correct as to island because this species is otherwise unknown from Kaua'i. Although the Degeners did not indicate where the type was located, the leaf description closely fits the BISH collection. Part 2 was published on 8 Aug. 1960.

*Phyllostegia rubritincta* H. St. John, *Phytologia* 63: 181. 1987. Syn. nov. TYPE: Hawaiian Islands [U.S.A.]. Lana'i: extreme head, Maunalei, on S slope of Lanaihale, 10 Mar. 1915, *G. C. Munro* s.n. (holotype, BISH-53448).

**6b. *Phyllostegia glabra*** (Gaudichaud) Benth var. ***lanaiensis*** Sherff, *Bot. Gaz.* (Crawfordsville) 96: 136. 1934. *Phyllostegia lanaiensis* (Sherff) H. St. John, *Phytologia* 63: 177. 1987. TYPE: Hawaiian Islands [U.S.A.]. Lana'i: side of mountain, 1864–1865, *H. Mann & W. T. Brigham* 354 (holotype, F not seen; isotype, BISH).

*Phyllostegia glabra* var. *lanaiensis* is listed as endangered (Herbst, 1990, 1991). It is historically known from Lana'ihale, but was definitely known only from Kaiholena Gulch (Herbst, 1991), and was last observed in the 1980s by R. Hobdy in a gulch feeding into the back of Maunalei Valley, another drainage from Lana'ihale (Herbst, 1990, 1991); however, this observation appears to have actually been of *P. glabra* var. *glabra* (J. Lau, pers. comm. 1998).

**7. *Phyllostegia grandiflora*** (Gaudichaud) Benth, *Edwards's Bot. Reg.* 15: 1292. 1830. *Prasium grandiflorum* Gaudichaud, *Voy. Uranie* 453. 1829. TYPE: s.l., 530–735 m, 1819, *C. Gaudichaud-Beaupré* s.n. (holotype, P not seen).

*Phyllostegia grandiflora* (Gaudichaud) Benth var. *majoricalycis* H. St. John, *Phytologia* 63: 175. 1987. Syn. nov. TYPE: Hawaiian Islands [U.S.A.]. O'ahu: s.l., May 1825, *J. Macrae* s.n. (holotype, GH-1421).

**8. *Phyllostegia haliakalae*** Wawra, *Flora* 55: 530. 1872. TYPE: Hawaiian Islands [U.S.A.]. Maui: East Maui, foot of Haleakala, in dry ravine, 1869–1870, *H. Wawra* 1874 (holotype, W not seen; isotype, W).

*Phyllostegia imminuta* (Sherff) H. St. John, *Phytologia* 63: 175. 1987. Syn. nov. *Phyllostegia helleri* Sherff var. *imminuta* Sherff, *Amer. J. Bot.* 21: 699. 1934. TYPE: Hawaiian Islands [U.S.A.]. Lana'i: Kaiholena, 17 Mar. 1916, *Mrs. C. Forbes* s.n. (holotype, BISH-510031).

*Phyllostegia mollis* Benth var. *micrantha* Sherff, *Amer. J. Bot.* 21: 700. 1934. TYPE: Hawaiian Islands [U.S.A.]. Lana'i: Maunalei Valley, 25 June 1913, *C. N. Forbes* 170.L (holotype, BISH-510099).

*Phyllostegia deltoidea* H. St. John, *Phytologia* 63: 174. 1987. Syn. nov. TYPE: Hawaiian Islands [U.S.A.]. Moloka'i: gulch of Maunahui, 21 Mar. 1910, *J. F. Rock* 6127 (holotype, BISH-53705; isotype, GH).

*Phyllostegia makawaoensis* H. St. John, *Phytologia* 63: 177. 1987. Syn. nov. TYPE: Hawaiian Islands [U.S.A.]. Maui: East Maui, Makawao, *J. M. Lydgate* s.n. (holotype, BISH-53689). The type is possibly a mixed collection; a densely villous sterile stem represents either another species or a juvenile shoot. The label on this collection is one made by Forbes for Hillebrand and Lydgate material, which gives both as collectors and was used on many collections made exclusively by Lydgate.

*Phyllostegia triquerta* H. St. John, *Phytologia* 63: 182. 1987. Syn. nov. TYPE: Hawaiian Islands [U.S.A.]. Maui: East Maui, Haleakala, Ulupalakua, 7000 ft., 1864–1865, *H. Mann & W. T. Brigham* 404 (holotype, BISH-53687; isotype, GH).

This species was treated as *Phyllostegia imminuta* by Wagner et al. (1990), but examination of the type of *P. haliakalae* showed it to be the same taxon. It was historically known from Lana'i (last collected in 1928 near Maunalei, *Munro* 247, BISH), East Maui (Wagner et al., 1990), and from Moloka'i (*Degener* 5395 in 1928, BISH); it is apparently extinct as it has not been collected in 70 years.

**9. *Phyllostegia helleri*** Sherff, *Bot. Gaz.* (Crawfordsville) 96: 138. 1934. TYPE: Hawaiian Islands [U.S.A.]. Kaua'i: above Waimea, Kaholuamanoa [Kaholuamanu], 12 Oct. 1895, *A. A. Heller* 2875 (holotype, US-368712; isotypes, F not seen, GH not seen, MO, NY microfiche seen). The date on the holotype and the GH and NY sheets is 11–16 Oct., but both Heller and Sherff cited 12 Oct. for this collection.

*Phyllostegia olokeleensis* H. St. John, *Phytologia* 63: 179. 1987. Syn. nov. TYPE: Hawaiian Islands [U.S.A.]. Kaua'i: Olokele, *J. M. Lydgate* 15 (holotype, BISH-53552).

*Phyllostegia helleri* was listed from only Koke'e Plateau and Mount Kahili by Wagner et al. (1990). The Mount Kahili collections have been excluded here as *P. kahiliensis*. *Phyllostegia helleri* appears to be closely related to *P. wawrana*, now that more material is available of the latter species, but differs in its shorter hirtellous pubescence, the trichomes 0.5–1 mm long, strictly terminal inflorescences, shorter pedicels (1–)3–5 mm long, and calyx veins relatively inconspicuous. It is known from the Koke'e Plateau and appears to be extinct, as it has not been collected since 1916 (*Hitchcock* 15367, US; Oct. 1916, *Rock* s.n., BISH).

**10. *Phyllostegia hillebrandii*** H. Mann ex Hil-

lebrand, Fl. Hawaiian Isl. 350. 1888. TYPE: Hawaiian Islands [U.S.A.]. Maui: [East Maui], woods of Kula, July 1858, *W. Hillebrand s.n.* (lectotype, designated by Sherff (1936: 30), B [presumably destroyed, fragment BISH-499095]; isolectotype, BISH). Additional syntype: woods of Ulupalakua, *W. Hillebrand s.n.* (B presumably destroyed). Another sheet at BISH states "Ulupalakua and Kula, East Maui." US has one sheet collected by Hillebrand without a specific locality.

*Phyllostegia hillebrandii* is known only from the two collections cited above and is almost certainly extinct (Wagner et al., 1990).

**11. *Phyllostegia hirsuta*** Bentham, Edwards's Bot. Reg. 15: 1292. 1830. TYPE: Hawaiian Islands [U.S.A.]. O'ahu: 9–26 May 1825, *J. Macrae s.n.* (holotype, K). Published as "*P.? hirsuta*."

*Phyllostegia hirsuta* Bentham var. *laxior* O. Degener & Sherff, in Degener, Fl. Hawaiiensis, fam. 316. *Phyllostegia hirsuta*. 1934. *Phyllostegia laxior* (O. Degener & Sherff) H. St. John, Phytologia 63: 177. 1987. TYPE: Hawaiian Islands [U.S.A.]. O'ahu: summit of Pig-god Trail, Hau'ula, 31 May 1931, *O. Degener, K. K. Parks, D. L. Topping & W. Bush 5363* (holotype, F not seen; isotype, BISH).

*Phyllostegia ternaria* H. St. John, Phytologia 63: 182. 1987. Syn. nov. TYPE: Hawaiian Islands [U.S.A.]. O'ahu: Wai'anae [Mountains], Kalua'a-Lualualei Ridge, Kalua'a, on N face, well-shaded open but steep terrain, 808 m, 7 Mar. 1982, *J. Obata, P. Kores, M. Touw & K. Simens 441* (holotype, BISH-520636; isotypes, BISH [3]).

*Phyllostegia hirsuta*, although historically known from the central Wai'anae Mountains (from Kukui'ula (Pahole) Gulch to North Palawai Gulch) and nearly throughout the Ko'olau Mountains (from Pupu'kea-Kahuku Trail to Palolo Valley), is now restricted to 10 populations in the Wai'anae Mountains in the southern part of its range from Makaha and Wai'anae Kai to North Palawai Gulch, and from only 6 populations in the Ko'olau Mountains from Kawainui Gulch in Kawaihoa Training Area to South Kaukonahua drainage. It was listed as endangered in 1996 (Brueggmann, 1995c; Russell & Brueggmann, 1996b). The total number of known individuals is less than 200. J. Lau (pers. comm. 1998) gave a view seemingly at variance with this assessment of less than 200 individuals. He said, "There are numerous populations in the Wai'anae Mountains, with many plants. There are also many populations in the Ko'olau Mountains, with many plants, although it has not been seen in recent decades in the southern part of the mountain range."

**12. *Phyllostegia hispida*** Hillebrand, Fl. Hawaiian Isl. 353. 1888. TYPE: Hawaiian Islands [U.S.A.]. Moloka'i: heights of Mopulehu, July 1870, *W. Hillebrand s.n.* (holotype, B [presumably destroyed, fragment BISH-510033]; isotypes, MEL not seen [photo BISH], US [possible]).

*Phyllostegia hispida* is known only from the mountainous eastern portion of Moloka'i. It was last collected in 1979 (*Jacobi & Higashino 1561*, BISH). The current status of all populations is not known, and J. Lau (pers. comm. 1998) considered this species to be endangered. He reported that only three solitary plants have been seen in recent years, and one of them died about two years ago. Both of the living plants are on the Pelekunu rim, one in Kamakou Preserve, the other in Pu'u Ali'i Natural Area Reserve. The dead plant was in Kamakou Preserve in the Waikolu Drainage.

**13. *Phyllostegia kaalaensis*** H. St. John, Phytologia 63: 176. 1987. TYPE: Hawaiian Islands [U.S.A.]. O'ahu: Wai'anae Mts., below Pu'u Pane, Palikea Gulch, 45° slope, mesic summer dry forest, 1900 ft., 24 Apr. 1977, *J. Obata, G. Carr & D. Palmer 77–315* (holotype, BISH-522881; isotype, BISH).

Wagner et al. (1990) discussed the populations here treated as *Phyllostegia kaalaensis* as possibly distinct from *P. glabra*. *Phyllostegia kaalaensis* differs from *P. glabra* in having leaves with dentate margins and calyces and bracts sparsely ciliate. It is listed as endangered (Brueggmann, 1995c; Russell & Brueggmann, 1996b). It is known from only five populations and about 50 individuals from scattered areas in the Wai'anae Mountains ('Ekahanui Gulch, Pahole Gulch, Palikea Gulch, and Wai'anae Kai). In August and September 1998 J. Lau (pers. comm. 1998) visited several populations of *P. kaalaensis* at three locations (Wai'anae Kai, Pahole Gulch, and 'Ekahanui Gulch), with a total of about 20 plants. The other populations (Palikea Gulch, and additional drainages in Pahole and Ekahanui Gulches) have not been revisited in 10–20 years. Lau estimated the total number of plants still alive may be under 100. The Wai'anae Kai population has gone way down in numbers since it was first found seven years ago. The mesic habitat of this species is very threatened.

**14. *Phyllostegia kahiliensis*** H. St. John, Phytologia 63: 176. 1987. TYPE: Hawaiian Islands [U.S.A.]. Kaua'i: steep, moist slope just below the summit of Kahili Peak, to the south,

860 m, 4 Jan. 1974, *J. J. Fay 156* (holotype, PTBG-5552; isotype, BISH).

The three collections of this species from Mount Kahili at ca. 860 m were included under *Phyllostegia helleri* by Wagner et al. (1990), but they pointed out that unlike all other populations of *P. helleri* these three specimens (the type, *Flynn et al. 2228*, PTBG, and *Wagner et al. 5217*, BISH) have retrorsely appressed pubescence and may represent a distinct taxon. *Phyllostegia helleri* always has spreading trichomes throughout its range. It seems best to recognize the population with retrorsely appressed pubescence as distinct. Similar pubescence differences are characteristic in a number of other species in the genus, often making identifications difficult. It also has pedicels only 1–2 mm long, whereas *P. helleri* has pedicels usually 3–5(–9) mm long. Field or greenhouse study is needed to determine whether there are other differences. *Phyllostegia kahiliensis* is apparently very rare.

**15. *Phyllostegia knudsenii*** Hillebrand, Fl. Hawaiian Isl. 354. 1888. TYPE: Hawaiian Islands [U.S.A.]. Kaua'i: woods of Waimea, s.d., *V. Knudsen 190* (holotype, B [presumably destroyed, fragment BISH-49904]).

*Phyllostegia knudsenii* was known only from the type collection from the woods of Waimea on Kaua'i and was considered extinct by Wagner et al. (1990). An individual of this species was located in the Koai'e Canyon growing in diverse mesic forest and was reported by Lorence et al. (1995). It was listed as endangered based on this rediscovery (Brueggemann, 1995a; Russell & Brueggemann, 1996a). It is currently known from two locations in Koai'e Canyon.

This species, along with *P. wawrana* and *P. floribunda*, was placed in *Phyllostegia* sect. *Lateriflorae* A. Gray by Sherff (1935). The same delimitation was followed by Wagner et al. (1990). Based on the ample material now at hand I exclude all but the type, *P. floribunda*, from the section, because the others have both axillary and terminal inflorescences. With the exclusion of these two white-flowered species the section can now also be characterized by red corollas.

**16. *Phyllostegia lantanoides*** Sherff, Bot. Gaz. (Crawfordsville) 96: 137. 1934. TYPE: Hawaiian Islands [U.S.A.]. O'ahu: Ka'ala Mts., 1864–1865, *H. Mann & W. T. Brigham s.n.* (holotype, CU [photo F not seen]).

*Phyllostegia atomifera* H. St. John, Phytologia 63: 172.

1987. Syn. nov. TYPE: Hawaiian Islands [U.S.A.]. O'ahu: Mt. Ka'ala, boggy area behind chopper landing pad in tangle of *Rubus penetrans*. May 1981, *B. H. Gagné s.n.* (holotype, BISH-512414).

*Phyllostegia lantanoides* Sherff var. *konahuanuiana* H. St. John, Phytologia 63: 177. 1987. Syn. nov. TYPE: Hawaiian Islands [U.S.A.]. O'ahu: Manoa-Palolo ridge, 2450 ft., 6 Jan. 1932, *H. St. John 11506* (holotype, BISH-404541; isotype, BISH).

*Phyllostegia oahuensis* H. St. John, Phytologia 63: 178. 1987. Syn. nov. TYPE: Hawaiian Islands [U.S.A.]. O'ahu: Ka'ala summit, boggy spot near TV station, 4025 ft., 12 Apr. 1981, *B. H. Gagné s.n.* (holotype, BISH-440780).

**17. *Phyllostegia macrophylla*** (Gaudichaud) Bentham, Edwards's Bot. Reg. 15: 1292. 1830. [Epithet published as "*macrophyllum*."] *Prasiium macrophyllum* Gaudichaud, Voy. Uranie 453. 1829. TYPE: s.l., 550–735 m, 1819, *C. Gaudichaud-Beaupré s.n.* (holotype, P). Based on distribution of this species, Gaudichaud probably collected the type on Hawai'i. St. John treated this collection as mixed, using the short infructescence as the holotype of *P. interrupta* H. St. John.

*Phyllostegia clavata* Bentham, Edwards's Bot. Reg. 15: 1292. 1830. TYPE: Hawaiian Islands [U.S.A.]. Hawai'i: "Owhyee, monte ignovomo," 1825, *J. Macrae s.n.* (holotype, K not seen).

*Phyllostegia macrophylla* (Gaudichaud) Bentham var. *phytolaccoides* Sherff, Bot. Gaz. (Crawfordsville) 96: 137. 1934. *Phyllostegia phytolaccoides* (Sherff) H. St. John, Phytologia 63: 179. 1987. TYPE: Hawaiian Islands [U.S.A.]. Maui: [East Maui], E of Olinda, very wet forest along pipe line, 4000 ft., 1 Oct. 1916, *A. S. Hitchcock 14897* (holotype, US-1172391).

*Phyllostegia macrophylla* (Gaudichaud) Bentham var. *remyi* Sherff, Bot. Gaz. (Crawfordsville) 96: 136. 1934. *Phyllostegia remyi* (Sherff) H. St. John, Phytologia 63: 180. 1987. TYPE: Hawaiian Islands [U.S.A.]. Maui: s.l., 1851–1855, *J. Rémy 386* (holotype, GH-1425; isotype, P not seen).

*Phyllostegia brevilobata* H. St. John, Phytologia 63: 173. 1987. Syn. nov. TYPE: Hawaiian Islands [U.S.A.]. Maui: West Maui, Honokahau drainage basin, 25 Sep.–17 Oct. 1917, *C. N. Forbes 502.M* (holotype, BISH-53669).

*Phyllostegia cernua* H. St. John, Phytologia 63: 173. 1987. Syn. nov. TYPE: Hawaiian Islands [U.S.A.]. Hawai'i: North Hilo Dist., Laupahoehoe section of Hilo Forest Reserve, 3100 ft., 4 Mar. 1981, *L. W. Cuddihy & J. Davis 770* (holotype, BISH-513588; isotype, BISH).

*Phyllostegia hualalaiensis* H. St. John, Phytologia 63: 175. 1987. Syn. nov. TYPE: Hawaiian Islands [U.S.A.]. Hawai'i: Pu'u Hualalai, Pu'uwa'awa'a, 5500 ft., 29 Dec. 1931, *H. St. John, J. W. Coulter, Hashimoto, Lindsay & Mitchell 11355* (holotype, BISH-520688; isotypes, BISH [6]).

*Phyllostegia interrupta* H. St. John, Phytologia 63: 176. 1987. Syn. nov. TYPE: Sandwich, *C. Gaudichaud s.n.* (holotype, P). St. John treated the type of *Prasiium macrophyllum* as a mixed collection, using the

- short infructescence as the holotype of *P. interrupta* H. St. John.
- Phyllostegia kohalaensis* H. St. John, *Phytologia* 63: 176. 1987. Syn. nov. TYPE: Hawaiian Islands [U.S.A.], Hawai'i: Mountains of Kohala, W of Honokanenui Gorge, June 1910, *J. F. Rock* 8377 (holotype, BISH-53655 [and -53656]; isotype, BISH). The isotype is numbered 8378. Rock often numbered his duplicates individually; the status is based on locality and date.
- Phyllostegia lehuaensis* H. St. John, *Phytologia* 63: 177. 1987. Syn. nov. TYPE: Hawaiian Islands [U.S.A.], Hawai'i: Kona, Pulehua, Jan. 1912, *J. F. Rock s.n.* (holotype, BISH-92705; isotype, BISH).
- Phyllostegia ovata* H. St. John, *Phytologia* 63: 179. 1987. Syn. nov. TYPE: Hawaiian Islands [U.S.A.], Hawai'i: Honaunau Forest Reserve, 'ohi'a-koa forest, 4050 ft., 28 Mar. 1980, *G. Clarke, J. Davis, L. Cuddihy & C. Corn* 3 (holotype, BISH-520640; isotypes, BISH [3]).
- Phyllostegia phytolaccoides* (Sherff) H. St. John var. *salebrosa* H. St. John, *Phytologia* 63: 179. 1987. Syn. nov. TYPE: Hawaiian Islands [U.S.A.], Maui: *F. R. Warshauer* 2876 (holotype, BISH not seen). The holotype has been missing since at least October 1987; there is a specimen of *P. macrophylla*: Maui: Hana District, along Koukouai Gulch, SW of Kipahulu Valley, wet koa-'ohi'a forest, 22 July 1980, *Warshauer & McEldowney* 2867 (BISH-469843), which may be the type if St. John transposed the number.
- Phyllostegia plurinodosa* H. St. John, *Phytologia* 63: 180. 1987. Syn. nov. TYPE: Hawaiian Islands [U.S.A.], Hawai'i: Kohala Mts., USFWS Forest Bird Survey Transect 77, Stat. 5 53/54, 2500 ft., 2 Aug. 1979, *F. R. Warshauer* 2495 (holotype, BISH-520653).
- Phyllostegia reflexa* H. St. John, *Phytologia* 63: 180. 1987. Syn. nov. TYPE: Hawaiian Islands [U.S.A.], Hawai'i: Hilo Forest Reserve, Laupahoehoe Section, within 100–200 ft. of W boundary of fence line [with] Wai-punalei, 8 Sep. 1981, *J. Davis* 598 (holotype, BISH [on loan from Hawaii State Division of Land and Natural Resources]). Although published as at BISH, the holotype is part of a Hawaii State Division of Land and Natural Resources loan that will hopefully be given to BISH for permanent storage following recommendation 7A of the ICBN (Greuter et al., 1994).
- Phyllostegia retrorsa* H. St. John, *Phytologia* 63: 180. 1987. Syn. nov. TYPE: Hawaiian Islands [U.S.A.], Hawai'i: Hilea forests, 8 May 1961, *J. F. Rock s.n.* (holotype, BISH-53648).
- Phyllostegia rubescens* H. St. John, *Phytologia* 63: 181. 1987. Syn. nov. TYPE: Hawaiian Islands [U.S.A.], Hawai'i: Hilo Forest Reserve, Laupahoehoe section, W of Kilau Stream, 2750 ft., 9 Feb. 1982, *J. Davis* 685 (holotype, BISH-520030).
- 18. *Phyllostegia mannii*** Sherff, *Bot. Gaz. (Crawfordsville)* 96: 136. 1934. Nom. nov. Replaced name: *Stenogyne parviflora* H. Mann, *Proc. Amer. Acad. Arts* 7: 193. 1867. TYPE: Hawaiian Islands [U.S.A.], Maui: East Maui, Haleakala, [NW side], 6000–7000 ft., 1864–1865, *H. Mann & W. T. Brigham* 407 (holotype, GH not seen; isotypes, BISH [2], MO not seen, US).
- Phyllostegia racemosa* Bentham var. *bryanii* Sherff, *Amer. J. Bot.* 21: 699. 1934. *Phyllostegia bryanii* (Sherff) H. St. John, *Phytologia* 63: 173. 1987. Syn. nov. TYPE: Hawaiian Islands [U.S.A.], Moloka'i: heights back of Kamolo, 1851–1871, *W. Hillebrand s.n.* (holotype, B [presumably destroyed]; isotype, MEL not seen [photo BISH]).
- Phyllostegia mannii* is listed as endangered (Yoshioka et al., 1991; Herbst et al., 1992). The information on distribution and populations has not changed since reported by Wagner et al. (1990). It was last collected in 1979 on Moloka'i. Reports of it from 1985 by Wagner et al. (1990) based on observations rather than collections were apparently a misidentification of *P. hispida*.
- 19. *Phyllostegia micrantha*** H. St. John, *Phytologia* 63: 178. 1987. TYPE: Hawaiian Islands [U.S.A.], O'ahu: Wai'anae Range, Popouwela, 27 Apr. 1910, *C. N. Forbes* 1589.0 (holotype, BISH-53660).
- When studying the type of this species for this paper I was unable to place it in any other known species of the genus. It has small, elliptic, hirsute leaves 6–10 cm long, 6–8 flowers per verticillaster, and the calyx is only 2.5–2.7 mm long, the smallest in the genus. I therefore provisionally accept it as a distinct species. No other collections are known to me.
- 20. *Phyllostegia mollis*** Bentham, *Linnaea* 6: 79. 1831. *Phyllostegia parviflora* (Gaudichaud) Bentham var. *mollis* (Bentham) A. Gray, *Proc. Amer. Acad. Arts* 5: 344. 1862. TYPE: Hawaiian Islands [U.S.A.], O'ahu: 1816–1817, *L. C. A. von Chamisso s.n.* (holotype, LE not seen).
- Phyllostegia honolulensis* Wawra, *Flora* 55: 531. 1872. *Phyllostegia parviflora* (Gaudichaud) Bentham var. *honolulensis* (Wawra) Sherff, *Bot. Gaz. (Crawfordsville)* 96: 138. 1934. TYPE: Hawaiian Islands [U.S.A.], O'ahu: dry woods near Honolulu, 1869–1870, *H. Wawra* 1988 (holotype, W not seen [photo BISH]).
- Phyllostegia obatae* H. St. John, *Phytologia* 63: 178. 1987. Syn. nov. TYPE: Hawaiian Islands [U.S.A.], O'ahu: Wai'anae Range, subgulch of Kalua'a Gulch, N of the central ridge, 1900 ft., 19 Mar. 1978, *J. Obata, D. Palmer & E. Funk* 354 (holotype, BISH-520646; isotypes, BISH [5]).
- Phyllostegia swezeyi* H. St. John, *Phytologia* 63: 181. 1987. Syn. nov. TYPE: Hawaiian Islands [U.S.A.], O'ahu: Wai'anae Mountains, Pu'u Ka'ala, Mokuleia, Kamananui, gulch E of Pu'u Kaupakuhale, 2000 ft., 23 Oct. 1932, *O. Swezey, F. Williams, T. G. Yuncker & E. Y. Hosaka s.n.* (holotype, BISH-40354).
- Phyllostegia mollis* as described by Wagner et al.



(1990) was almost exclusively based on O'ahu plants, but did include some of Sherff's descriptive information because his *P. mollis* var. *mollis* was delimited in the same way as *P. mollis* by Wagner et al. I give the following diagnosis to clearly differentiate it from *P. pilosa*.

Stems densely short-hirtellous (trichomes somewhat antrorse). Leaves flaccid, ovate to occasionally elliptic-ovate, usually 10–24 cm long, 4–7 cm wide, lower surface glandular-dotted and short-hirtellous, densely so along veins, the trichomes erect, ca. 0.3 mm long, petioles (3.5–)5–7 cm long, flowers (2–4)6 per verticillaster, in relatively open and delicate inflorescences 8–17 cm long, pubescent with spreading to erect trichomes, usually 0.1–0.2 mm long, pedicels 2–3 mm long, calyx 3–4 mm long, short-hispidulous, more densely so toward the base, sometimes also more densely pubescent toward the apex, and conspicuously glandular-dotted, the teeth linear-deltate, 0.7–1 mm long, apex acute; corolla tube slender, slightly curved, 7.5–12 mm long, short-villous and conspicuously glandular-dotted, lower lip 6.5–9 mm long.

*Phyllostegia mollis* sensu Wagner et al. (1990) was listed as an endangered species in 1991 (Ellshoff et al., 1990, 1991a), and thus also included populations from Maui and Moloka'i giving *P. pilosa* protected status. Historically, *P. mollis* was known from the central and southern Wai'anae Mountains from Mt. Ka'ala to Honouliuli and from the Ko'olau Mountains above Honolulu. It is now known to be extant only in Kalua'a Gulch and Pu'u Kaua in the Wai'anae Mountains, and there are probably less than 50 individuals remaining. J. Lau (pers. comm. 1998) indicated he knew of only two locations for this species, with a total of about 20 plants. One population is in Honouliuli Preserve, and the other is in Schofield Barracks Military Reservation. He also mentioned that W. Takeuchi collected quite a few specimens in the late 1980s. In the label data of some of the specimens from Honouliuli (e.g., Ekahanui Gulch), he indicated that he saw fairly large numbers of this species. These populations have not been relocated.

**21a. *Phyllostegia parviflora* (Gaudichaud) Benth. var. *parviflora***

*Phyllostegia parviflora* (Gaudichaud) Benth., *Linnaea* 6: 79. 1831. *Prasium parviflorum* Gaudichaud, *Voy. Uranie* 453. 1829. TYPE: s.l., 550–735 m, 1819, *C. Gaudichaud-Beaupré* s.n. (holotype, P not seen).

*Phyllostegia parviflora* (Gaudichaud) Benth. var. *canescens* Sherff, *Amer. J. Bot.* 21: 700. 1934. TYPE: Hawaiian Islands [U.S.A.], Maui: West Maui, mountains, 1840, *U. S. Expl. Exped.* s.n. (holotype, US-57495).

*Phyllostegia parviflora* (Gaudichaud) Benth. var. *major* Sherff, *Amer. J. Bot.* 21: 700. 1934. TYPE: Hawaiian Islands [U.S.A.], O'ahu: Ko'olau Mts., Punalu'u, 14–21 Nov. 1908, *J. F. Rock* 565 (holotype, BISH-510100). Another sheet at BISH is labeled as Rock 963, but, based on locality and date, it is a possible isotype. Rock would often number duplicate specimens of collections made on the same day and at the same place sequentially or in some cases, such as this one, renumber the duplicates.

*Phyllostegia manoana* H. St. John, *Phytologia* 63: 177. 1987. Syn. nov. TYPE: Hawaiian Islands [U.S.A.], O'ahu: valley and ridge E of main Konahuinui trail, 16 Apr. 1909, *C. N. Forbes* 1306.0 (holotype, BISH-53739).

*Phyllostegia parviflora* is listed as an endangered species (Brueggemann, 1995d; Russell & Brueggemann, 1996c). *Phyllostegia parviflora* var. *parviflora* was known historically from the Ko'olau Mountains and a single collection from West Maui (type of *P. parviflora* var. *canescens*) in 1840. It is currently known from a single population of four plants along North Kaukonahua Stream (Brueggemann, 1995d; Russell & Brueggemann, 1996c). It is also known from a population of about 30 plants collected in 1995 from Pu'u Pauao, between Poamoho and Schofield Trail (*Perlman* 14705, PTBG, WU).

**21b. *Phyllostegia parviflora* (Gaudichaud) Benth. var. *glabriuscula* A. Gray, *Proc. Amer. Acad. Arts* 5: 344. 1862. *Phyllostegia glabriuscula* (A. Gray) H. St. John, *Phytologia* 63: 175. 1987. TYPE: Hawaiian Islands [U.S.A.], Hawai'i: Mount Kaah [Mauna Kea], 15–20 June 1825, *J. Macrae* s.n. (lectotype, here designated, GH-1430). St. John designated the other Macrae collection (also collected on Mauna Kea, June 1825, GH-1431) as the holotype of *P. curta*. He annotated this sheet as the lectotype, but did not publish the lectotypification. St. John was correct in distinguishing the two syntypes as separate collections, as the one designated holotype of *P. curta* is in early flowering and has very few glandular trichomes, whereas the other is in late flowering and has many more glandular trichomes. They do not, however, represent separate taxa in my view.**

*Phyllostegia curta* H. St. John, *Phytologia* 63: 174. 1987. Syn. nov. TYPE: Hawaiian Islands [U.S.A.], Hawai'i: Mount Kaah [Mauna Kea], 15–20 June 1825, *J. Macrae* s.n. (holotype, GH-1431). The sheet designated the holotype of *P. curta* by St. John is also one of two syntypes (both Macrae collections from Mauna Kea, June 1825) of *P. parviflora* var. *glabriuscula*. Mounted on the same sheet is a vegetative specimen of *P. parviflora* var. *parviflora* with a U. S. Expl. Exped. label, collected on O'ahu.

*Phyllostegia parviflora* is listed as an endangered species (Brueggemann, 1995d; Russell & Brueggemann, 1996c). *Phyllostegia parviflora* var. *glabriuscula* was known historically from a few collections from Manua Kea and has not been collected since the late 1800s and is presumed extinct.

**21c. *Phyllostegia parviflora*** (Gaudichaud) Benth. var. ***lydgatei*** (Sherff) W. L. Wagner, Novon 9: 282. 1999. *Phyllostegia mollis* Benth. var. *lydgatei* Sherff, Amer. J. Bot. 21: 700. 1934. *Phyllostegia lydgatei* (Sherff) H. St. John, Phytologia 63: 177. 1987. TYPE: Hawaiian Islands [U.S.A.], O'ahu: Wai'anae Mts., 1869, *J. M. Lydgate s.n.* (holotype, B [presumably destroyed]). O'ahu: s.l., *W. Hillebrand s.n.* (lectotype, designated by Wagner (1999), US-809370).

*Phyllostegia waianaeensis* H. St. John, Phytologia 63: 182. 1987. Syn. nov. TYPE: Hawaiian Islands [U.S.A.], O'ahu: Wai'anae Range, small gulch bottom inside of South Palawai Gulch, 2300 ft., 28 Mar. 1948, *R. L. Wilbur 609* (holotype, BISH-53699).

In the revision by Wagner et al. (1990) the Wai'anae Mountain plants were thought to perhaps represent a different variety. The situation was recently evaluated (Wagner, 1999), and the Wai'anae Mountain populations were recognized as a distinct variety, *P. parviflora* var. *lydgatei*. It is known at 730–825 m, from Napepeiaulelo Gulch and North Palawai Gulch, Wai'anae Mountains, O'ahu. This taxon appears to be restricted to north-facing slopes and is quite rare, with a current estimate of one extant population in North Palawai Gulch with about 20 known individuals. When *Phyllostegia parviflora* was listed as endangered (Brueggemann, 1995d; Russell & Brueggemann, 1996c) these populations were included, although a formal name under *P. parviflora* was not yet available.

**22. *Phyllostegia pilosa*** H. St. John, Phytologia 63: 179. 1987. TYPE: Hawaiian Islands [U.S.A.], Maui: East Maui, Ukulele, Mar. 1912, *J. F. Rock s.n.* (holotype, BISH-53706; isotype, BISH).

*Phyllostegia brevis* H. St. John, Phytologia 63: 173. 1987. Syn. nov. TYPE: Hawaiian Islands [U.S.A.], Maui: *H. Wawra 1915* (holotype, W not seen; isotype, W). The label states only "Kauai" for the locality, but Wawra cited this collection (Flora 55: 530. 1872) as "Kauai, Wälder des Haliakala." This locality is on East Maui.

*Phyllostegia brighamii* H. St. John, Phytologia 63: 173. 1987. Syn. nov. TYPE: Hawaiian Islands [U.S.A.], Maui: West Maui, ridge above Kamalaea Bay, 1864–

1865, *H. Mann & W. T. Brigham 405* (holotype, GH; isotype, BISH).

*Phyllostegia kamokuensis* H. St. John, Phytologia 63: 176. 1987. Syn. nov. TYPE: Hawaiian Islands [U.S.A.], Moloka'i: Kamoku Camp, 20 Mar. 1912, *J. F. Rock 6119* (holotype, BISH-53696; isotypes, BISH, NY).

*Phyllostegia kauaiensis* H. St. John, Phytologia 63: 176. 1987. Syn. nov. TYPE: Hawaiian Islands [U.S.A.], Kaua'i: *H. Wawra 2310* (holotype, W). The label states only "Kauai" for the locality, but Wawra cited this collection (Flora 55: 530. 1872) as "Kauai, Wälder des Haliakala." This locality is on East Maui.

*Phyllostegia triangularis* H. St. John, Phytologia 63: 182. 1987. Syn. nov. TYPE: Hawaiian Islands [U.S.A.], Moloka'i: above Kamolo near Pelekuna, Apr. 1910, *J. F. Rock 7023* (holotype, BISH-53691; isotype, NY).

This species was included within *Phyllostegia mollis* by Wagner et al. (1990) following Sherff (1935), but without seeing any specimens. Later, I studied specimens from Moloka'i and Maui determining them to represent a different species than the O'ahu plants. I began using the name *Phyllostegia haliakalae* for it as this was the oldest name in the synonymy of *P. mollis* in the 1990 treatment, but omitted entirely in Sherff's revision (1935). When I examined an isotype of *Phyllostegia haliakalae* I found that it represented an older name for the species treated by Wagner et al. (1990) as *P. imminuta*. Thus, I have here selected *P. pilosa* for this species among the names available. It differs from *P. mollis*, which is restricted to O'ahu, in several characters, most notably the greater number of flowers per verticillaster, closer spacing of verticillasters, shorter pedicels, smaller flowers, smaller leaves, and shorter petioles. The following is a brief diagnosis to contrast *P. pilosa* with *P. mollis*, as well as to distinguish it from other species in the genus.

Stems moderately short-hirtellous, the trichomes spreading, usually somewhat antrorsely so. Leaves ovate to occasionally elliptic-ovate, up to 8–14 cm long, 3–4.5(–7.5) cm wide, lower surface glandular-dotted and short-hirtellous, densely so along veins, the trichomes erect to somewhat crinkly, 0.2–0.3 mm long, petioles 2.5–3.2(–4.5) cm long, flowers 6–12 per verticillaster, in relatively narrow, usually simple inflorescences 7–12 cm long, pubescent with spreading to erect trichomes usually 0.1–0.2 mm long, pedicels 0.6–1.8 mm long, calyx 3.2–3.6 mm long, short-hispidulous, more densely so toward the apex, and inconspicuously glandular-dotted, the teeth linear-deltate, 0.7–1.6 mm long, apex acute; corolla tube slender, slightly curved, 7.3–10 mm long, short-villous, the trichomes somewhat appressed, and inconspicuously glandular-dotted, lower lip 3.5–5.5 mm long.

*Phyllostegia mollis* sensu Wagner et al. (1990) was listed as an endangered species in 1991 (Ellshoff et al., 1990, 1991a), and thus included populations from Maui and Moloka'i, giving *P. pilosa* protected status. Ellshoff et al. (1991a) reported a population of a few individuals of *P. pilosa* discovered by R. Hobdy and J. Lau in Waiopai Gulch on East Maui; I have not been able to confirm their identification. Other than this population the species was most recently collected in 1989 at Waikamoi, TNCH [The Nature Conservancy of Hawaii] preserve, in 1989 in Honomanu Gulch on East Maui (Perlman et al. 10773, PTBG), and in 1912 on Moloka'i (Poholua, Forbes 102.Mo, BISH). J. Lau (pers. comm. 1998) reported another population more than 4 km away, in the northwestern corner of Waikamoi Preserve, near the Waikamoi Flume road. He last saw this population in 1997, when there were at least three plants still alive.

**23. *Phyllostegia racemosa*** Bentham, Edwards's Bot. Reg. 15: 1292. 1830. TYPE: Hawaiian Islands [U.S.A.]. Hawai'i: montem Kaah [Mauna Kea], 15–20 June 1825, *J. Macrae s.n.* (holotype, K).

*Phyllostegia rhuakos* H. St. John, Phytologia 63: 181. 1987. Syn. nov. TYPE: Hawaiian Islands [U.S.A.]. Hawai'i: Kipukas, flow of 1823, level of Keawe Wye, 28 June 1915, *C. N. Forbes 983.H* (holotype, BISH-53747).

*Phyllostegia racemosa* is listed as endangered (Brueggemann, 1995b, 1996). Historically, it was known to usually grow epiphytically in mesic to wet forests in the Hakalau and Saddle Road areas of Mauna Kea and the Kulani/Keauhou and Kipuka Ahiu areas of Mauna Loa. Currently only four populations are known from Hakalau, Kulani/Keauhou, and in Hawaii Volcanoes National Park with at least 45 individuals (Brueggemann, 1996).

**24. *Phyllostegia renovans*** W. L. Wagner, Novon 9: 280. 1999. TYPE: Hawaiian Islands [U.S.A.]. Kaua'i: Hanalei District, headwaters of Wainiha River, NE fork, just SW of Mahinakehau Ridge, 680–825 m, 29–30 Jan. 1993, *D. H. Lorraine, S. Perlman & K. Wood 7315* (holotype, US-3362751; isotypes, BISH, PTBG).

*Phyllostegia renovans* was discovered in 1989, after the most recent revision of the genus was in press, and was not described until 1999. It is unique in the genus in that the stems resume vegetative growth after flowering. A brief diagnosis is: erect subshrub becoming scandent and the stems up to 3–4 m long, short-hirsute throughout with leaves narrowly to broadly ovate, flowers (4–)6(–8) per verticillaster, apparently the stem resuming vegetative growth after flowering, calyx campanu-

late, 8–12 mm long, the lobes 4–7 mm long, margins with 1 to several coarse teeth, apex acute; corolla white, ca. 19–22 mm long. It is relatively rare with 23 small populations known only from three adjacent valleys on the northeastern part of the island of Kaua'i, Hawaiian Islands (Hanakoa, Limahuli, and Wainiha), at 680–1040 m; it grows along watercourses and at the bases of waterfalls.

**25. *Phyllostegia rockii*** Sherff, Bot. Gaz. (Crawfordsville) 96: 139. 1934. TYPE: Hawaiian Islands [U.S.A.]. Maui: [East Maui], flank of Haleakala, 1220–1525 m, s.d., *J. M. Lydgate s.n.* (holotype, B presumably destroyed). This name is based on the unnamed *Phyllostegia hispida* Hillebrand var.  $\beta$  Hillebrand.

*Phyllostegia rockii* is known from only three collections from East Maui, the most recent of which was made in 1912; it is almost certainly extinct (Wagner et al., 1990).

**26. *Phyllostegia stachyoides*** A. Gray, Proc. Amer. Acad. Arts 5: 344. 1862. TYPE: Hawaiian Islands [U.S.A.]. Hawai'i: [in the district of] Waimea, 1840, *U. S. Expl. Exped. s.n.* (holotype, US-57485).

*Phyllostegia stachyoides* A. Gray var. *hitchcockii* Sherff, Amer. J. Bot. 21: 700. 1934. *Phyllostegia hitchcockii* (Sherff) H. St. John, Phytologia 63: 175. 1987. TYPE: Hawaiian Islands [U.S.A.]. Moloka'i: Puko'o, Mr. Conrad's place, rain forest, 8 Oct. 1916, *A. S. Hitchcock 15069* (holotype, US-874519).

*Phyllostegia mollis* Bentham var. *glabrescens* O. Degener & Sherff, in Degener, Fl. Hawaiiensis, fam. 316. *Phyllostegia mollis*. 1935. TYPE: Hawaiian Islands [U.S.A.]. Moloka'i: W of Pepe'opae [Bog], open rain forest, 12 Apr. 1928, *O. Degener 5413* (holotype, F not seen; isotypes, BISH, NY). The label on the BISH sheet indicates isotypes at MO, MICH, and B.

*Phyllostegia ledyardii* H. St. John, Pacific Sci. 30: 27. 1976. TYPE: Hawaiian Islands [U.S.A.]. Hawai'i: [slopes of Mauna Loa above Kealakekua], 26–29 Jan. 1779, *D. Nelson s.n.* (holotype, BM-550455).

*Phyllostegia brevicalycis* H. St. John, Phytologia 63: 172. 1987. Syn. nov. TYPE: Hawaiian Islands [U.S.A.]. Maui: West Maui, Wailuku Pali, 21 May 1920, *C. N. Forbes 2446.M* (holotype, BISH-53760).

*Phyllostegia molokaiensis* H. St. John, Phytologia 63: 178. 1987. Syn. nov. TYPE: Hawaiian Islands [U.S.A.]. Moloka'i: Nualele Valley, 18 Mar. 1952, *O. Degener & A. Tam 22202* (holotype, W not seen [photo BISH]; isotype, BISH).

*Phyllostegia montana* H. St. John, Phytologia 63: 178. 1987. Syn. nov. TYPE: Hawaiian Islands [U.S.A.]. Moloka'i: Transect 1, Station 4, 2930 ft., 14 July 1982, *F. R. Warshauer 2408* (holotype, BISH-437828).

*Phyllostegia occidentalis* H. St. John, Phytologia 63: 178. 1987. Syn. nov. TYPE: Hawaiian Islands [U.S.A.]. Maui: West Maui, Ukumehame Gulch, 4500 ft., 28

Dec. 1955, *H. St. John, R. Palmer, G. Pearsall & H. A. Woolford* 25696 (holotype, BISH-522873; isotype, BISH [fragment]).

*Phyllostegia olokuiensis* H. St. John, *Phytologia* 63: 179. 1987. Syn. nov. TYPE: Hawaiian Islands [U.S.A.]. Moloka'i: Wailau, Olokui, Wailele Stream, mossy rain forest, 3700 ft., 4 Feb. 1948, *H. St. John & R. L. Wilbur* 23246 (holotype, BISH-630988; isotype, BISH).

*Phyllostegia pilosula* H. St. John, *Phytologia* 63: 180. 1987. Syn. nov. TYPE: Hawaiian Islands [U.S.A.]. Moloka'i: Moloka'i Dist., S of Papa'ala Pali, W of Kuana Ridge, 4500 ft., 17 July 1979, *F. R. Warshauer & P. H. McEldowney* 2438 (holotype, BISH-522982).

*Phyllostegia stachyoides* is now quite rare and is probably endangered, despite its three-island distribution on eastern Moloka'i, West Maui, and Hawai'i. The most recent collections are from Moloka'i (Wawaia Gulch in 1997, *Wood* 6280, AD, BISH, NY, PTBG, US) and collections from West Maui (Honokohau Falls in 1996, *Wood* 5555, PTBG, US, and in 1997, *Perlman & Wood* 15768, AD, BISH, HAST, K, NY, US; Lihau in 1992, *Welton & Haus* 1571, BISH; Hanaula in 1985, *Hobdy* 2399, BISH; Pu'u Kukui in 1996, *Perlman et al.* 15368, BISH, PTBG, US). I am unaware of any recent collections from the island of Hawai'i; however, J. Lau (pers. comm. 1998) indicated that The Nature Conservancy records show the most recent collection was in 1978 (North Kona, Keauhou 1).

**27. *Phyllostegia tahitensis*** Nadeaud, *Enum. Pl. Tahiti* 56. 1873. TYPE: Society Islands. Tahiti: Mount Marau, ravines, 1200 m, 26 May 1859, *J. Nadeaud* 373 (holotype, P not seen; isotype, G not seen).

This species is apparently known only from the type collection and is almost certainly extinct. Sherff (1935) provided a description.

**28. *Phyllostegia tongaensis*** H. St. John, *Phytologia* 63: 182. 1987. TYPE: Tonga. 'Ata Island, 11 Nov. 1958, *E. Soakai* 226 (K not seen).

**29. *Phyllostegia variabilis*** Bitter, *Abh. Naturwiss Vereine Bremen* 16: 432. 1900. TYPE: Laysan, near the shore, on W and E sides, 1896–1897, *H. H. Schauinsland s.n.* (holotype, BREM not seen; isotypes, BISH [2]).

*Phyllostegia arenicola* H. St. John, *Phytologia* 63: 172. 1987. Syn. nov. TYPE: Midway Atoll. Eastern Island, central plain, 3 m, 23 Apr. 1923, *E. L. Caum* 25 (holotype, BISH-53767).

*Phyllostegia variabilis* is extinct; it was last observed in 1961 (Wagner et al., 1990).

**30. *Phyllostegia velutina*** (Sherff) H. St. John, *Phytologia* 63: 182. 1987. *Phyllostegia macrophylla* (Gaudichaud) Benth var. *velutina* Sherff, *Bot. Gaz. (Crawfordsville)* 96: 137. 1934. TYPE: Hawaiian Islands [U.S.A.]. Hawai'i: Mauna Kea, 1840, *U. S. Expl. Exped. s.n.* (holotype, US-57471).

*Phyllostegia velutina* was raised to specific level by St. John, and was accepted in the most recent revision (Wagner et al., 1990). It is listed as endangered (Brueggemann, 1995b, 1996). Historically, it occurred on the southern slopes of Hualalai and the eastern, western, and southern slopes of Mauna Loa. Currently, it is known from populations in three areas (Pu'uwa'awa'a, Honuaua Forest Reserve, and Kulani/Keauhou area) with estimates of up to 116 individuals (Brueggemann, 1995b, 1996; U.S. Fish and Wildlife Service, 1998). Another population is presumably at Waiea Tract, but its location and status are unknown (Brueggemann, 1995b, 1996). Among the remaining populations I have seen specimens only from the Kulani population.

**31. *Phyllostegia vestita*** Benth, *Edwards's Bot. Reg.* 15: 1292. 1830. TYPE: Hawaiian Islands [U.S.A.]. Hawai'i: Byron's Bay [Hilo], 23 June–16 July 1825, *J. Macrae s.n.* (holotype, K).

*Phyllostegia dentata* Benth, *Edwards's Bot. Reg.* 15: 1292. 1830. TYPE: Hawaiian Islands [U.S.A.]. Hawai'i: Mount Kaah [Mauna Kea], 23–16 June–July 1825, *J. Macrae s.n.* (holotype, K; isotype, GH not seen).

*Phyllostegia catenulata* H. St. John, *Phytologia* 63: 173. 1987. Syn. nov. TYPE: Hawaiian Islands [U.S.A.]. Hawai'i: Parker Ranch, Pa'auhau 2, *J. F. Rock* 3439 (holotype, BISH-53658).

*Phyllostegia foliosa* H. St. John, *Phytologia* 63: 175. 1987. Syn. nov. TYPE: Hawaiian Islands [U.S.A.]. Hawai'i: Alakahi, Kawainui, ditch trail, 13 July 1909, *J. F. Rock* 4314 (holotype, BISH-512417).

*Phyllostegia multiflora* H. St. John, *Phytologia* 63: 178. 1987. Syn. nov. TYPE: Hawaiian Islands [U.S.A.]. Hawai'i: mountains above Waimea, June 1910, *J. F. Rock* 8312 (holotype, BISH-53771; isotype, BISH).

*Phyllostegia pubens* H. St. John, *Phytologia* 63: 180. 1987. Syn. nov. TYPE: Hawaiian Islands [U.S.A.]. Hawai'i: South Kohala Dist., Kohala Mts. along Kehena Ditch, USFWS Forest Bird Survey transect 78(15), wet 'ohi'a forest, 4200 ft., 31 July 1979, *F. R. Warshauer & P. H. McEldowney* 2477 (holotype, BISH-520644; isotype, BISH).

*Phyllostegia serrata* H. St. John, *Phytologia* 63: 181. 1987. Syn. nov. TYPE: Hawaiian Islands [U.S.A.]. Hawai'i: South Kohala Dist., Kohala Mountains, along Kehena Ditch, USFWS Forest Bird Survey Transect 78 (20/21), 4300 ft., 2 Aug. 1979, *F. R. Warshauer & P. H. McEldowney* 2490 (holotype, BISH-469857).

*Phyllostegia sexiflora* H. St. John, *Phytologia* 63: 181. 1987. Syn. nov. TYPE: Hawaiian Islands [U.S.A.], Hawai'i: South Hilo Dist., E slope of Mauna Kea between Pu'u Akala and Puaka'a near Honoli'i Stream, 2580 ft., 13 Sep. 1977, *F. R. Warshauer & P. H. McEldowney* 1405 (holotype, BISH-469847).

**32. *Phyllostegia waimeae*** Wawra, *Flora* 55: 531. 1872. TYPE: Hawaiian Islands [U.S.A.], Kaua'i: [Waimea District,] Halemanu, 1869–1870, *H. Wawra* 2115 (holotype, W not seen; isotypes W [2]).

*Phyllostegia cordata* H. St. John, *Phytologia* 63: 173. 1987. Syn. nov. TYPE: Hawaiian Islands [U.S.A.], Kaua'i: Koke'e camp, 26 June 1926, *collector unknown s.n.* (holotype, BISH-513263). The collector was almost certainly O. Degener, as he was collecting at Halemanu on 26 and 27 June 1926 (Degener, 1969).

*Phyllostegia hobdyi* H. St. John, *Phytologia* 63: 175. 1987. Syn. nov. TYPE: Hawaiian Islands [U.S.A.], Kaua'i: below Waimea Canyon rim on W side, 2800 ft., 3 June 1969, *R. Hobdy* 109 (holotype, BISH-32511).

*Phyllostegia waimeae* is listed as endangered (Ellshoff et al., 1991b; Merhroff et al., 1994). It was historically known only from the western part of the Waimea Canyon drainage, including Halemanu, Ka'aha, Kaholuamanu, and Kawai'iki, but was undoubtedly more widespread in the Koke'e area. By 1969 it was known from a single individual in Waimea Canyon (Merhroff et al., 1994). Its current status is unknown, and it is perhaps extinct.

**33. *Phyllostegia warshaueri*** H. St. John, *Phytologia* 63: 182. 1987. TYPE: Hawaiian Islands [U.S.A.], Hawai'i: O'okala Trail, Hamakua, 28 May 1979, *F. R. Warshauer* 4005 (leg. *M. Tamich*) (holotype, BISH-520652).

*Phyllostegia ambigua* (A. Gray) Hillebrand var. *longipes* Hillebrand, *Fl. Hawaiian Isl.* 350. 1888. *Phyllostegia brevidens* A. Gray var. *longipes* (Hillebrand) Sherff, *Amer. J. Bot.* 21: 699. 1934. TYPE: Hawaiian Islands [U.S.A.], Hawai'i: s.d., *J. M. Lydgate s.n.* (holotype, B presumably destroyed; isotypes, BISH, MEL not seen [photo BISH]). This plant is presently known only from Hawai'i, and there is strong doubt that the type was collected on Maui, although the original label says "probably E. Maui."

*Phyllostegia warshaueri* was raised to specific level by St. John and was accepted in the most recent revision (Wagner et al., 1990). It is listed as endangered (Bruegmann, 1995b, 1996). Historically, it occurred on the northern slopes of Mauna Kea (Laupahoehoe) and from the Kohala Mountains. Currently, it is known from two populations in the Kohala Mountains, with estimates of 5 to 10 individuals (Bruegmann, 1995b, 1996), and Hamakua

(O'okala Trail). Since listing, it has been rediscovered in Laupahoehoe near Kilau Stream (3 to 10 plants, *Perlman et al.* 14185, 14691, both US).

**34. *Phyllostegia wawrana*** Sherff, *Bot. Gaz.* (Crawfordsville) 96: 139. 1934. TYPE: Hawaiian Islands [U.S.A.], Kaua'i: s.l., 23–29 Feb.–Mar. 1870, *H. Wawra* 2060a (holotype, W not seen; isotype, W).

Considered extinct by Wagner et al. (1990), this Kaua'i endemic species was known only from four collections from Hanalei, Koke'e Stream, and the Koke'e area and was last collected in 1926. Recent collecting efforts by the National Tropical Botanical Garden (Lorence et al., 1995) resulted in discovery of five populations of *Phyllostegia wawrana*: a Makaleha Plateau site with about 20–30 plants in two populations in a lowland wet forest; a few individuals in Wainiha Valley, below Hinalale Falls in a lowland wet forest; three plants in the upper Hanakoa drainage in a montane wet forest with riparian vegetation; a population of 5–6 individuals in the back of Honopu Valley growing along a stream bed in *Metrosideros–Dicranopteris* montane wet forest; and Nuololo, Kuia Natural Area Reserve, in a *Metrosideros–Dicranopteris* montane mesic forest with a few individuals. It was listed as endangered based on these rediscoveries (Bruegmann, 1995a; Russell & Bruegmann, 1996a). *Phyllostegia wawrana* appears to be closely related to *P. helleri* but differs in the longer, stouter trichomes of the stem and inflorescences (0.6–)0.8–1.3 mm long, longer pedicels 9–11 mm long, conspicuous veins on the calyx, and in having inflorescences axillary and sometimes also terminal. This species, along with *P. knudsenii* and *P. floribunda*, was placed in *Phyllostegia* sect. *Lateriflorae* A. Gray by Sherff (1935). The same delimitation was followed by Wagner et al. (1990). Based on the ample material now at hand I exclude all but the type, *P. floribunda*, from the section, because the others have both axillary and terminal inflorescences. With the exclusion of these two white-flowered species the section can now also be characterized by red corollas.

#### DOUBTFUL NAMES:

*Phyllostegia decemiflorifer* H. St. John, *Phytologia* 63: 174. 1987. TYPE: Hawaiian Islands [U.S.A.], Hawai'i: *F. R. Warshauer* 1649 (holotype, BISH not seen). The holotype has been missing at least since October 1987.

*Phyllostegia glandulosa* H. St. John, *Phytologia* 63: 175. 1987. St. John did not adequately designate a unique collection as the type, as no specific locality, no date, and no collector number were given, and Rock made numerous collections in Kona. St. John only cited

- "Hawai'i, Kona, *J. F. Rock*." No *Rock* collection of *Phyllostegia* from Kona could be located. = Probably *P. stachyoides* A. Gray based on the description.
- Phyllostegia insignis* H. St. John, *Phytologia* 63: 175. 1987. St. John did not adequately designate a unique collection as the type, as no locality, no date, and no collector number were given. He only cited "Maui, A. Medeiros." = *P. ambigua* (A. Gray) Hillebrand based on the description.
- Phyllostegia kilaueaensis* H. St. John, *Phytologia* 63: 176. 1987. TYPE: Hawaiian Islands [U.S.A.]. Hawai'i: Kilauea Forest Reserve, *F. R. Warshauer & R. L. Stemmermann s.n.* (holotype, BISH not seen). No specimen matching the given information was found. = Probably *P. velutina* (Sherff) H. St. John based on the description. St. John did not adequately designate a unique collection as the type, as no specific locality, no date, and no collector number were given.
- Phyllostegia secunda* H. St. John, *Phytologia* 63: 181. 1987. TYPE: Hawaiian Islands [U.S.A.]. Kaua'i: Kaholuamano, *J. F. Rock s.n.* (holotype, BISH not seen). St. John did not adequately designate a unique collection as the type, as no specific locality, no date, and no collector number were given, and *Rock* made numerous collections in Kaholuamano. St. John only cited "Kaua'i, Kaholuamano, *J. F. Rock*." No *Rock* collection of *Phyllostegia* from Kaholuamano, Kaua'i, could be located. The short description was not adequate to determine the species.

## EXCLUDED NAMES:

- Phyllostegia haplostachya* A. Gray, *Proc. Amer. Acad. Arts* 5: 345. 1862. TYPE: Hawaiian Islands [U.S.A.]. Maui: sand hills [of the low isthmus], 1840, *U. S. Expl. Exped. s.n.* (holotype, US-57480; isotype, GH [fragment] not seen). Sherff (1935) cited 2 sheets at US. = *Haplostachys haplostachya* (A. Gray) H. St. John.
- Phyllostegia haplostachya* A. Gray var. *leptostachya* A. Gray, *Proc. Amer. Acad. Arts* 5: 345. 1862. TYPE: Hawaiian Islands [U.S.A.]. Kaua'i: mts. [on barren ridges], 1840, *U. S. Expl. Exped. s.n.* (holotype, US-57479; isotypes, GH not seen, K, NY not seen). = *Haplostachys haplostachya* (A. Gray) H. St. John.
- Phyllostegia leptostachys* Benth., *Edwards's Bot. Reg.* 15: 1292. 1830. TYPE: Hawaiian Islands [U.S.A.]. Hawai'i: s.l., 1825, *J. Macrae s.n.* (holotype, K). = *Haplostachys haplostachya* (A. Gray) H. St. John.
- Phyllostegia linearifolia* Drake, *Ill. fl. ins. pacif.* 47. t. 20. 1886. TYPE: "Ins. Sandvicensibus," 1851–1855, *J. Rémy* 396 (holotype, P not seen). = *Haplostachys linearifolia* (Drake) Sherff.
- Phyllostegia longiflora* Caum, *Occas. Pap. Bernice P. Bishop Mus.* 9(5): 9. 1930. TYPE: Hawaiian Islands [U.S.A.]. Maui: East Maui, Kula pipeline trail, edge of gulch in deep forest, 7 Feb. 1929, *H. Lyon & E. L. Caum* 150 (holotype, BISH-507697; isotypes, BISH [2]). = *Stenogyne kamehamehae* Wawra.
- Phyllostegia rosmarinifolia* H. Mann, *Boston Soc. Nat. Hist. Mem.* 1: 536. 1869. *Nom. nud.*
- Phyllostegia truncata* A. Gray, *Proc. Amer. Acad. Arts* 5: 345. 1862. TYPE: Hawaiian Islands [U.S.A.]. Maui: 1851–1855, *J. Rémy* 395 (holotype, GH not seen; isotypes, BISH, fragment of B specimen at BISH, P?). = *Haplostachys truncata* (A. Gray) Hillebrand.

## HYBRIDS:

- Phyllostegia cowanii* H. St. John, *Phytologia* 63: 174. 1987. TYPE: Hawaiian Islands [U.S.A.]. O'ahu: Ridge Trail to Palikea, Honouliuli Forest Reserve, Wai'anae Range, 3000 ft., 4 Feb. 1948, *R. S. Cowan* 808 (holotype, BISH-76011). = *P. glabra* (Gaudichaud) Benth. var. *glabra* × *P. hirsuta* Benth. Another collection (Wai'anae Mts., Honouliuli Preserve, below Pu'u Kaua, 2770 ft., 9 May 1996, *Wood* 5216, BISH, PTBG, US) also appears to represent a hybrid of this combination. It differs, however, in its closer resemblance to *P. hirsuta*, differing from it primarily in its narrower leaves, less pubescent leaves and stems with somewhat retrorse trichomes, longer pedicels, and larger calyx. This gives the plant a superficial appearance of *P. parviflora*, but it does not have any glandular trichomes, and the non-glandular ones are much longer than in *P. parviflora*. Both putative parents occur in the general area. *Phyllostegia glabra* was growing with *Wood* 5216 (according to his label), and I found collections (*Perlman* 5237, BISH, PTBG, US) of *P. hirsuta* growing at least as close as the summit crest between Pu'u Kaua and Pu'u Kanehoa.
- Phyllostegia yamaguchii* Hosaka & O. Degener, *Occas. Pap. Bernice P. Bishop Mus.* 14(3): 27. 1938. TYPE: Hawaiian Islands [U.S.A.]. O'ahu: Ko'olau Range, La'ie, Pu'u Kainapuaa, 2500 ft., 19 Dec. 1937, *E. Y. Hosaka & M. Yamaguchi* 1924 (holotype, BISH-510105; isotypes, BISH [2], US). Probable hybrid of *P. glabra* (Gaudichaud) Benth. var. *glabra* × *P. hirsuta* Benth.

## INVALIDLY PUBLISHED NAMES:

- Phyllostegia decumbens* H. St. John, *Phytologia* 63: 174. 1987. *Stenogyne adpressa* H. St. John, *Phytologia* 63: 159. 1987. Neither of these names are validly published under ICBN Art. 34.2 (Greuter et al., 1994). St. John used part of the same specimen, *C. N. Forbes* 183.H (BISH-408112), as the type of both names. = *P. ambigua* (A. Gray) Hillebrand.
- Phyllostegia kauensis* H. St. John, *Phytologia* 63: 176. 1987. *Phyllostegia moniliformis* H. St. John, *Phytologia* 63: 178. 1987. Neither of these names is validly published under ICBN Art. 34.2 (Greuter et al., 1994). St. John used the same specimen, *J. D. Jacobi* 722 (BISH-426000), as the type for both names. = *P. macrophylla* (Gaudichaud) Benth.
- Phyllostegia leukantha* H. St. John, *Phytologia* 63: 177. 1987. *Phyllostegia longitubata* H. St. John, *Phytologia* 63: 177. 1987. Neither of these names is validly published under ICBN Art. 34.2 (Greuter et al., 1994). St. John used the same specimen, *R. Hobdy* 802 (BISH-522879), as the type for both of these names. = *P. ambigua* (A. Gray) Hillebrand.
- Phyllostegia parviflora* (Gaudichaud) Benth. var. *gaudichaudi* A. Gray, *Proc. Amer. Acad. Arts* 5: 344. 1862. Not validly published, as this should have been the autonymic variety (ICBN Art. 26.2; Greuter et al., 1994). = *P. parviflora* (Gaudichaud) Benth. var. *parviflora*.

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